



Docket No.FAA-2021-0846

**RFI Response
Detailed CONOPS**

Prepared For

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General information

What is the very broad “high level” situation proposed by the petition?

- a) What is the nature of the business / operation? (Manufacturer, operator, system integrator, etc.)

Reference: SkySkopes Petition – A.1.1. Organization Overview

SkySkopes is a professional flight operator that provides innovative solutions within the energy industry. SkySkopes specializes in aerial data acquisition using unmanned and manned aircraft equipped with advanced sensor solutions. SkySkopes brings an extensive background of expertise in implementing critical safety procedures and processes into our workflow for professional and efficient operations for our clients. SkySkopes completes tens of thousands of flights each year near electrical transmission & distribution, substations, refineries, well sites, compressor stations, and pipelines.

The industrial asset spray cleaning concept is in response to oil and gas clients need to efficiently clean assets such as flare stacks to prevent wildfires. The use of an unmanned spray solution can provide an effective method to clean assets while minimizing risk to site personnel and reducing operational downtime.

- b) Geographic operating boundaries (lack of specifics implies very broad NAS access)

Reference: SkySkopes Petition – A.2.2 Operations Area and A.2.3 Airspace Overview

The requested operations will be flown on industrial sites such as oil well sites, compressor stations, refineries, etc. Our clients have assets across the U.S. with the majority being in oil and gas basins in North Dakota, Montana, Wyoming, Colorado, Oklahoma, and Texas.

- c) Will launch/fly/recovery only occur over private property with owner’s permission?
Flights will occur on/over client sites with their permission and will be coordinated with their operations team.

- d) Define the minimum and maximum operating altitude of the vehicle
The maximum altitude is largely determined by hose length acting as a tether for the aircraft, however, the aircraft would not be more than 50 feet above the structure that is being cleaned. The minimum operating altitude would be the 5-10’ above the flare height. We expect assets from our current clients to be 30-175’ tall.

- e) Intent to operate within or beyond Visual Line of Sight (VLOS)
The flight profile is within LOS.

f) Define command and control link

Reference: SkySkopes Petition – A.3.2 Communication Equipment

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

The aircraft is controlled via 2.4 and 5.8 Ghz transmission in a dual band configuration that prioritized highest signal strength via the controller.

g) Supply information on dimensions, materials & processes necessary to define the vehicle design.

Reference: SkySkopes Petition – A.3.1 UAS Description and subsections

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

h) Identify the congestion of the proposed operating area(s)

The operating areas are on industrial sites and the flight envelop remains within that area. There is not expected to be any congestion in the proposed operating areas because the flights will remain within a couple hundred feet laterally and within 25-50 ft vertically of the asset.

i) Identify the vehicle's maximum cruise speed

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

Reference: SkySkopes Petition – A.3.1.5 Aircraft Performance Characteristics

Agras T16 and T20 maximum cruise speed: 10 m/s : 22 mph

There is not a planned cruise phase for the operations as the normal profile is ascent, hover/maneuver for cleaning, and descent.

j) Describe the proposed Airspace Classes

Reference: SkySkopes Petition – A.2.3 Airspace Overview

Operations will be limited to Class G airspace unless an appropriate Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA) has been obtained that authorizes operations in other Classes of airspace. Given the rural locations of most energy production /processing areas, we expect the vast majority of operations to be in uncontrolled airspace.

k) Define the Proposed Operating Airspace

Reference: SkySkopes Petition – A.2.3 Airspace Overview and section j above

- l) Describe location of the control station

The pilot holds the controller during the operation and stands in a location close to the asset to maximize line of sight with the aircraft and the other crew members.

Mission

Clear and concise statement of what the operator wants to accomplish.

- a) Intended mission/use of the UAS (surveillance, agricultural applicator, cargo delivery, etc.)

SkySkopes mission is to provide safer and more efficient cleaning of vertical industrial assets by utilizing a UAS equipped with a spraying payload connected by hose to a pressure washing system on the ground.

Execution

How will the intended operation/mission be executed?

- a) Identify Airspace considerations (peculiarities & congestion of particular airspace, special use, etc.)

Reference: SkySkopes Petition – A.2.3 Airspace Overview

See “General Information: section h” on congestion.

The flights will remain within a 200 hundred feet laterally and within 25-50 ft vertically of the asset.

- b) Launch & Recovery details/ location(s)

Once on site, the PIC will identify a primary LZ and alternate LZ. The aircraft has been modified to utilize a launch and recovery platform to accommodate the sprayer nozzles during standard operation. In an emergency situation which requires an alternate LZ to be utilized; the nozzles are designed to bend without risk to the airframe in the event the aircraft needs to land without the recovery platform.

- c) Describe the vehicle’s proximity to people, infrastructure and surface vehicles.

Congestion on the ground is limited because the sites are restricted to only company employees or contractors. If there are workers on the site, they are directed away from any flight operations. There may be feed pipes or other infrastructure in the vicinity. The launch/recovery area is selected to allow for a clear path for ascent and maneuvering over the asset to be cleaned.

- d) Describe the vehicle’s proximity to other NAS users

The operating areas are on industrial sites and the flight envelop remains within that area. There is no expected conflicting air traffic because the flights will remain within 200 hundred feet laterally and within 25-50 ft vertically of the asset.

- e) Flight Into Known Icing (FIKI)?
No planned flight operations into Known Icing.
- f) Meteorological conditions for operation (Visual/Instrument conditions)
All operations planned for visual conditions.
- g) Identify the Automation Level (occasional autopilot, 100% autonomous, manual control, etc.)
During operations, the PIC manually controls the aircraft.
- h) Minimum crew and support personnel?
Reference: SkySkopes Petition – A.2.1 Flight Crew
Minimum crew PIC, VO, and Payload Operator
- i) Role(s) of the crew and support personnel
Reference: SkySkopes Petition – A.2.1 Flight Crew
- j) Will flight over people not involved in the operation occur? ie. Road crossings, etc.
No flight over people not involved in the operation.
- k) Identify any requests for airspace be blocked-off for their exclusive use.
No exclusive use airspace is requested
- l) What is the operator/vehicle ratio (1:1, etc.)
1:1
- m) Night operations?
This operation will only take place during daylight hours.
- n) Plans for safety of Operator(s) and Observer(s)
Crews will follow SkySkopes SOPs for general safety during operations. When crews arrive to a site, they will determine a launch/recovery location to minimize exposure to individuals on the ground and nearby assets. A thorough preflight of the aircraft will be conducted to ensure the aircraft and payload systems are ready to operate. A risk assessment and crew safety briefing will be accomplished to identify and discuss hazards and risk mitigation strategies. During the operation, the crews will be in in constant communication via radio and hand signals. All members of the crew will be wearing hard hat, safety glasses, fire resistant clothing, high visibility vest, and safety toe boots.

Crews will be audited periodically by designated safety officers in the field during operations. A report of the audit will be generated for management and will be recorded by the safety manager. The audit will consist of random check of safe operations in accordance with company policy and government regulatory bodies. An after action

review will be conducted with the crew after an audit to inform them of any deviations and suggested improvements.

- o) State certification and training level of each team member.

Reference: SkySkopes Petition – A.2.8 Training

Reference: SkySkopes Petition - A.5 Proposed Conditions and Limitations #4, 8, 9, 10, 11

For spray cleaning operations, crews will be receiving training on the specific mission equipment and procedures. Operators will work under an instructor pilot and will only perform operations once the instructor pilot has deemed them safe to do so. This training is supplementary to their standard training that all pilots must receive.

Command & Signal

State command & signal amongst the various components of the entire system (vehicle, control station, control link, observers, etc.).

Reference: SkySkopes Petition – A.3.2 UAS Control Segment

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

- a) Describe communication between the Operator, Observer and Crew Members (visual, radio, etc.)

SkySkopes crews utilize wireless over-ear communication headsets during the operation. The crews are also briefed and trained on hand signals should the headsets malfunction or fail during the flight. All crew members remain in line of sight of each other for the duration of the operation to allow for effective verbal and nonverbal communication.

- b) Describe the electronic security of the Control Link

Reference SkySkopes petition section A.3.2 UAS Control Segment

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

- c) Describe the physical security of the operator and control station

The physical security of the operator and control station is mainly through the sites being restricted to only company employees or contractors. Additionally, the other crew members monitor the operations area to keep any bystanders away and communicate any issues with the operator.

- d) Describe real time situational awareness features

There are no airspace situational awareness features onboard the aircraft.

- e) Describe the number of operators, and hand-off between control stations (direct/“daisy chain”, etc.)

Not Applicable.

- f) Describe Lost Link Procedures or Loss of Positive Control
Reference: SkySkopes Petition – A.3.6 C2 Link Lost
It is highly unlikely that aircraft will lose link or there will be a loss of positive control because of the close proximity of the controller to the aircraft. If there is a lost link the aircraft will maintain altitude, proceed to the home point, descend, and land. If there is a loss of positive control the aircraft is tethered so it will remain in the operational area until it enters a failsafe mode and attempts to return to the home point or land in place.
- g) Describe communication expectations w/ATC
Communication with ATC is not expected during operations.
- h) Describe Emergency Procedures
Reference: SkySkopes Petition – A.2.6 Abnormal operation and emergency operation.

Administration & Logistics

Coordination required to conduct the operations.

- a) Community Outreach Plans (Flying / Non-Flying Public, municipalities, airports, etc.)
Community outreach plans are not expected because the operations will occur on private sites with the industrial assets. In the unlikely case that the assets are located near an area which may be readily observable by the public, SkySkopes will work with through the client to notify the public in the vicinity to the operations.
- b) When/if flight plans will be filed with Air Traffic Control (VFR/IFR)
Flight plans are not expected to be filed for these operations.
- c) Liaisons with Air Traffic Control (ATC)
Liaisons with ATC are not expected for these operations. If a project requires access to controlled airspace, SkySkopes will submit a waiver request to the FAA and following any requests to coordinate with ATC.
- d) MISHAP Reporting Procedures
Reference: SkySkopes Petition – A.2.7 of the SkySkopes petition.
- e) When/if NOTAMs will be posted
NOTAMs are not planned to be posted for these operations.

Contingency Procedures

Contingency procedures should at least contain:

Reference section A.2.6 Abnormal operation and emergency operation in the SkySkopes petition.

- a) Procedures to cope with lost C2 link, lost GPS signal, or fly-away situations.
Reference: Command and Signal section above section f) Describe Lost Link Procedures or Loss of Positive Control
Reference: SkySkopes Petition – A.3.6 C2 Link Lost
Reference: SkySkopes Petition- A.2.6 Abnormal operation and emergency operation – C2 Link Failure, GPS Failure
- b) Procedures to cope with the UA leaving the desired “flight geography”:
The aircraft is tethered to the ground via the water hose, effectively eliminating the possibility of a “fly-away.” The breaking strength of the hose and all associated payload linkages far exceeds the maximum thrust output of the aircraft, this is planned to ensure operational safety.
- c) Procedures to cope with the UA entering the “containment” area.:
Every member of the flight crew is at a minimum, trained as a visual observer. Crews are trained to constantly scan airspace for hazards. In the unlikely event that an aircraft is approaching the operational area, crews will stop work immediately and maneuver appropriately to avoid a conflict.
- d) Procedures to cope with adverse operating conditions (e.g. what to do in case icing is encountered during the operation, when the operation is not approved for icing conditions)
The industrial spraying operation will have the most stringent weather restrictions of any SkySkopes sUAS operation. There will not be flight in precipitation or icing conditions or if lightning is in the vicinity. The wind limit for the operation will be set at 15kts maximum and a minimum operational temperature of 32 degrees.
- e) Procedures to cope with the deterioration of external systems supporting the operation
Crews complete pre-departure and pre-flight checks of all systems. SkySkopes has a very active safety culture, and all employees are encouraged to immediately report any safety/equipment concerns including calling IMSAFE and ceasing operations until the situation is resolved. Also, our offices maintain a stock of spare components to support operations. We expect very few sprayer payload system or hose related issues since we are using only water and never exceeding the limitations of any of the equipment. All systems are checked by crew members during pre-flight.

- f) De-confliction scheme, i.e. the criteria that will be applied for the decision to avoid incoming traffic. In cases where the detection is performed by Visual Observers (VOs), the use of clear phraseology shall be established.
Every member of the flight crew is at a minimum, trained as a visual observer. Crews are trained to constantly scan airspace for hazards. In the unlikely event that an aircraft is approaching the operational area, crews will stop work immediately and maneuver appropriately to avoid a conflict. Given the close proximity to the asset, a small descent to be below the altitude of the asset will avoid incoming traffic.
- g) Avoidance procedures
Avoidance maneuvers may rely on performing a descent to a safe altitude, or an immediate landing if the traffic remains in the area.

Emergency Procedures

Emergency procedures to cope with emergency situations (where there is a loss of control of the operation that cannot be recovered), including at least:

Reference: SkySkopes Petition - A.2.6 Abnormal operation and emergency operation

- a) Procedures to avoid or, at least minimize, harm to third parties in the air or on the ground. With regard to the air risk, an avoidance strategy to minimize the collision risk with another airspace user (in particular, an aircraft with people on board) shall be included.
Due to the Proximity of the aircraft to the structure, we believe the risk of manned aircraft incursion into the operations area to be negligible. Additionally, all SkySkopes pilots are trained to monitor for air traffic and in collision avoidance techniques.
- b) Procedures for the emergency recovery of the UA
If an emergency recovery of the aircraft is required, the pilot will continue to manually control the aircraft and announce the emergency to the crewmembers. The spray payload will be shut down immediately and the pilot will descend the aircraft back to the recovery platform. In the event of an emergency where an alternate LZ may be utilized; the nozzles are designed to bend without risk to the airframe in the event the aircraft needs to land in an alternate LZ where the launch and recovery platform does not exist.

Information detailing the UA, and all associated systems

Detailed Description of the UA – Make / Model / Empty & Max weight, etc.

Reference: SkySkopes Petition - A.3 UAS Relevant Information in the SkySkopes petition.

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

Max intended operating weight, airspeed, and altitude.

Reference: SkySkopes Petition - A.3.1.4. Loads

Reference: SkySkopes Petition - A.3.1.5. Aircraft Performance Characteristics

Reference: SkySkopes Petition - A.5 Proposed Conditions and Limitations

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

Weight

Operations authorized by this exemption are limited to DJI Agras T-16 and Agras T-20, the operations described in the petition for exemption, and the operating documents. The maximum take-off weights of the T16 at 93 lbs. and T20 at 105 lbs.

Altitude

The UA must be operated at an altitude of no more than 400 feet above ground level (AGL).

Description of all Hardware and Software used in the control interface – GCS, Control Link, Navigation equipment, DAA systems, etc.

Reference section A.3.2. UAS Control Segment

UA Description

Information included should describe:

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

Reference: SkySkopes Petition – A.3.1 UAS Description

- a) A detailed description of the UA Airframe.
Reference: SkySkopes Petition - A.3.1 UAS Description
- b) A detailed description of the engine(s)/electric motor(s) utilized as part of the propulsion system.
Reference: SkySkopes Petition - A.3.1.6 Propulsion System
- c) A detailed description of the propeller(s)/rotor(s) utilized as part of the propulsion system.
Reference: SkySkopes Petition - A.3.1.6 Propulsion System

- d) A detailed description of all the navigation systems utilized including, but not limited to, any flight management software/hardware, Geo-fencing, Global Positioning System (GPS), Command and Control (C2) Link, and Long Term Evolution (LTE).
Reference: SkySkopes Petition - A.3.2 UAS Control Segment
- e) A detailed description of the payload system that will be utilized.
Reference: SkySkopes Petition - A.3.1.7 Payloads
Reference: SkySkopes Aircraft Modifications and Testing - B.1.2. Payload Modification and B.1.3. Sprayer Payload
- f) A detailed description of the UA Battery(ies) to include:
Agras T16: Single AB2 17500 14 Cell Lithium Battery W/ Emergency internal battery with 20 Second landing battery life
Agras T20: Single AB3 18000 14 Cell Lithium Battery W/ Emergency internal battery with 20 Second landing battery life
- g) A detailed description of the parachute system that will be utilized, if applicable.
N/A
- h) A detailed description of the GCS/controller.
Reference: SkySkopes Petition - A.3.2.4 User Interfaces

T16 uses a GL800N Controller with RTK Functionality
T20 uses Enterprise Controller with RTK Functionality
- i) A detailed description of the auto landing/emergency landing/forced landing system(s).
Reference: SkySkopes Petition - A.3.6 C2 Lost Link and A.3.7 Safety Features
- j) A detailed description of all life limited components of the UAS not already mentioned.
Aircraft hours are tracked via the Pilot application provided by DJI that tracks the aircraft hours. Flight logs are also decoded to provide detailed information regarding all life limited components. Reference below section: UA Testing and Reliability

UA Maintenance

Information detailing how the UA, and all associated systems will be maintained and repaired. Acceptable documentation will address the airframe, engine(s)/motor(s), propeller(s)/rotor(s), appliances, and any additional item or part that makes up the unmanned aircraft system (UAS) as a whole. This includes the Ground Control Station (GCS) and Controller.

Reference: SkySkopes Petition - A.5 Proposed Conditions and Limitations #18.

SkySkopes will maintain the aircraft by performing a thorough inspection every 20 hours of airtime the aircraft has accrued. Propellers will be replaced every 150 flight hours. Deep inspections will happen every 150 flight hours, inspecting all connections. Adding more Loctite to screws and retorquing if required, checking all connection points, and replacing any components showing wear. The aircrafts end of life will be no later than 800 flight hours.

UA Testing and Reliability

Information detailing any testing and reliability data the applicant possesses with respect to the UAS, to include all systems and sub-systems that comprise the UAS. Acceptable documentation would detail:

Reference: SkySkopes Petition - A.5 Proposed Conditions and Limitations #18.

Reference: SkySkopes Aircraft Modifications and Testing

To conduct spray cleaning operations, the stock spraying system is removed, and a proprietary payload is attached to the aircraft.

SkySkopes relies on the testing and reliability data collected by the manufacturer (DJI) during the development of the AGRAS T16 and T20 aircraft and always operating the aircraft under the manufacturer's established limitations. However, SkySkopes will incrementally confirm up to these limitations in a controlled environment during the payload and use case development.

A detailed description of the UA to include testing and reliability data that supports the following:

a) Establishment of Airframe Limitations

The aircraft is always operated within the manufacturers established limitations and test flights will be accomplished with the payload attached to confirm.

b) Establishment of Life Limits

Aircraft is maintained at the intervals suggested by the manufacturer.

Reference: Agras_T16_Disclaimer_and_Safety_Guidelines_v1.4_multi, (Maintenance)

Crews regularly confirm aircraft health via both hardware and software and perform maintenance/ wear checks before every operation on all aircraft.

c) Airframe – all locks of the engine arms

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

Crews perform a detailed arm, linkages, and hardware inspection before every flight. Minimally the arms and airframe and related systems are checked by the PIC and a second crew member before each flight.

d) Airframe – battery compartment and cable attachments

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

Crews perform a detailed inspection of the connection points, battery health monitor, and hardware before every flight. The battery connections and battery compartment and related systems are checked by the PIC and a second crew member before each flight.

e) Airframe – RX and TX antennae mounts

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

Crews perform a detailed inspection of the connection points, antenna mounts, remote signals health, and hardware relating to the RX and TX before every flight. Minimally RX and TX mounts and related systems are checked by the PIC and a second crew member before each flight.

f) Airframe – camera/payload attachment

Reference: SkySkopes Petition - A.3.1.7 Payloads

Reference: SkySkopes Aircraft Modifications and Testing - B.1.2. Payload Modification and B.1.3. Sprayer Payload

All payload systems/ attachment points are designed using CAD software allowing for a high level of accuracy for fitment and physics-based predictions of failure points. The payload was also incrementally ground tested up to and above all operating limitations established via the ratings of individual components. Minimally the payload related hardware, all mechanical linkages, and wear points are checked by the PIC and a second crew member before each flight.

UA Propulsion System

A detailed description of the engine(s)/electric motor(s) utilized as part of the propulsion system to include testing and reliability data used to support the establishment of Life Limits, if applicable.

A detailed description of the propeller(s)/rotor(s) utilized as part of the propulsion system to include testing and reliability data used to support the following:

Reference: SkySkopes Petition – A.3.1 UAS Description

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

Reference above section: UA Testing and Reliability

a) Establishment of Life Limits, if applicable

Life limits are established via the manufacturer and Skyskopes SOP

Reference: Agras_T16_Disclaimer_and_Safety_Guidelines_v1.4_multi

All pilots and VOs conduct an inspection on the propulsion system before every flight. Propellers are inspected before each flight for any kind of damage, including but not limited to; chips, cracks, deep scratches, delamination, loosened hubs, abnormal play, and excessively worn anti friction washers. If anything is found, the propellers are replaced. Motors are inspected on the same basis, including but not limited to; testing movement to detect abnormal bearing wear, grabbing or resistance in the motor, and visual defects in the windings and magnets. The DJI flight control system also runs a diagnostic check of motor and ESC propulsion system when the aircraft is powered on along with an initial boot up check of ESC's.

b) The dependability and security of the propeller(s)/rotor(s) attachment to include any associated components

Per the manufacture's specifications propeller connections are inspected before each flight and propeller mounts are installed using Loctite and torqued to spec to ensure loosening does not occur during operation of the aircraft.

c) Manufacturer of the propeller(s)/rotor(s), if other than the applicant.

DJI is the manufacturer.

d) Any additional testing and reliability data the applicant possesses with respect to the propeller(s)/rotors(s)

The flight hours of each prop set are tracked along with routine inspections.

Replacements are scheduled based on:

1. Flight hours per the 100 flight hours, or age of the prop set depending on whichever comes first.
2. Any defect that was identified during the routine inspection process.

UA Navigation System

A detailed description of all the navigation systems utilized including, but not limited to, any flight management software/hardware, Geo-fencing, Global Positioning System (GPS), Command and Control (C2) Link, and Long Term Evolution (LTE), to include:

Reference: SkySkopes Petition – A.3.1 UAS Description

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

- a) Any testing and reliability data the applicant possesses with respect to these, and other applicable, navigation systems.
SkySkopes utilizes dozens of DJI aircraft and we have not encountered C2 link issues at the close distances expected to be flown during asset cleaning operations.
- b) Loss of flight management software, GPS, C2 Link, and LTE operations, if applicable
Reference: Command and Signal section above section f) Describe Lost Link Procedures or Loss of Positive Control
Reference: SkySkopes Petition – A.3.6 C2 Link Lost
Reference: SkySkopes Petition- A.2.6 Abnormal operation and emergency operation – C2 Link Failure, GPS Failure
- c) Geo-fence procedures
N/A, the system is tethered.

UA Payload

A detailed description of the payload system that will be utilized to include testing and reliability data used to support the following:

Reference: SkySkopes Petition - A.3.1.7 Payloads

Reference: SkySkopes Aircraft Modifications and Testing - B.1.2. Payload Modification and B.1.3. Sprayer Payload

- a) Integration of the payload system with the UA
All payload systems/attachment points are designed using CAD software allowing for a high level of accuracy for fitment and physics-based predictions of failure points. The payload is secured to the aircraft via the landing gear support structure which is an integral part of the main aircraft frame. The payload was designed in such a way as to add to the structural integrity of the landing gear support structure and therefore does not in any way compromise the integrity of the main aircraft frame.

b) The security of the payload system to the UA

The payload is secured via bolt-through-materials/ material on material clamping methods relying on the physical interaction between the components. The same method of design is used in many of the manufacturer's original design components. The design intention with the payload was to mimic the manufacturer's trusted design theory.

c) Dependability of the attachment system with respect to payload security

The payload is secured via, PETG plastic, Carbon fiber weave, stainless steel, and aircraft grade aluminum components. These components are all specified to last an equivalent or greater amount of time to all original manufacture's components. All components are also rated multiples times in excess of their load bearing requirements.

d) Weight and shape of payload that can be carried

The payload does not extend beyond the bounds of the aircraft's footprint in the X and Y axis (horizontally). The weight is centered under the aircraft in the same way the manufacturers tanks were mounted in the stock configuration. In the Z axis (vertically) the sprayer tubes extend below the aircraft landing gear and has been accommodated in all functions of the operating procedures. The profile of the payload will remain unchanged. The max weight of the payload is well under the aircraft's full lifting capacity. The weight of the payload changes throughout the operating profile due to the tethered nature of the payload.

e) Any additional testing and reliability data the applicant possesses with respect to the payload system.

The payload has been ground (motors off) tested and low altitude tested in an under 55lb configuration and will continue to be routinely tested and additionally if changes are made (i.e. additional spray nozzles, different hose, etc.).

UA Batteries

A detailed description of the UA Battery(ies) to include testing and Reliability data that supports the following:

Reference: SkySkopes Petition – A.3.1 UAS Description

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

a) The security of the battery(ies) to the UA

Batteries are secured via a locking mechanism that must be positively engaged for the aircraft to be powered on. The locking mechanism securely holds the batteries during

operation until the locking mechanism is manually released by hand, post operation, at which time the aircraft has been turned off.

b) The establishment of Life Limits, if applicable

Battery Cycle Counts are tracked via the battery menu for the aircraft. Batteries are limited to no more than 400 cycles before being refurbished or replaced

c) The security of the battery(ies) connector(s) to the battery(ies).

The battery connectors are built into the batteries and cannot be removed as they are integral to the locking mechanism discussed in a). Tab style insert connectors are built into the batteries. The connection once established via securing of the locking mechanism cannot be broken without the batteries being removed from the aircraft via manual operation of the locking mechanism.

d) Battery reserve power and tracking of usage

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

Agras T16: Single AB2 17500 14 Cell Lithium Battery W/ Emergency internal battery with 20 Second landing battery life

Agras T20: Single AB3 18000 14 Cell Lithium Battery W/ Emergency internal battery with 20 Second landing battery life

Battery Cycle Counts are tracked via the battery menu for the aircraft. Batteries are limited to 400 cycles before being refurbished or replaced

e) Any additional testing and reliability data the applicant possesses with respect to the UA Battery(ies)

All new batteries from the manufacturer are tested on the aircraft in a non-operations state to confirm their proper function prior to being cleared for operational use.

UA Parachute – Not Applicable

A detailed description of the parachute system that will be utilized, if applicable, to include testing and reliability data used to support the following:

a) Establishment of Life Limits, if applicable

b) Determined descent rate of the aircraft after parachute deployment

c) Manufacturer of the parachute system, if other than the applicant.

d) Any additional testing and reliability data the applicant possesses with respect to the parachute system

UA Controller

A detailed description of the GCS/controller to include testing and reliability data used to support the following:

Reference: SkySkopes Petition – A.3.1 UAS Description

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

- a) Establishment of Life Limits, if applicable

No limits are established for the UA controller.

- b) Any additional testing and reliability data the applicant possesses with respect to the GCS/controller

All new controllers from the manufacturer are tested on the aircraft in a non-operations state to confirm their proper function prior to being cleared for field operations use. Whenever the aircraft is powered on, the status of the controller is monitored and the pilot is alerted to any abnormal operation (loss of signal, low battery, etc.).

UA Emergency Landing

A detailed description of the auto landing/emergency landing/forced landing system(s) to include:

Reference: SkySkopes Petition – A.3.1 UAS Description

Reference: DJI AGRAS T16 – User Manual v1.4

Reference: DJI AGRAS T20 - User Manual v1.2

- a) Any testing and reliability data the applicant possesses with respect to the auto landing/emergency landing/forced landing system(s)

Across the SkySkopes fleet the DJI “Return to Home” tests have been successfully conducted in a controlled environment with no failures. Aircraft always landed withing 2-3 feet of the original home point in all conditions tested.

A detailed description of the Flight Termination System (FTS)

The T16 and T20 aircraft are not equipped with an FTS system. The PIC can terminate flight manually through a Combination Stick Command (CSC). In order to perform the CSC, the pilot moves both sticks down and inward to their limit, holding them until the motors stop.

- a) Is the FTS command frequency independent of the command and control (C2) frequency used to control and provide navigation to the UA?
Not applicable
- b) If the FTS has autonomous capability: Not applicable
 - 1) How/when does it function? Not applicable
 - 2) How is it pre-flighted? Not applicable
 - 3) Does it have its own power source? Not applicable

UA Life Limited Components

A detailed description of all life limited components of the UAS not already mentioned to include:

- a) The Life Limits
Aircraft life limits are based on scheduled inspection and condition of the aircraft. Inspections happen every 20 hours of flight and deep inspections happen every 150 hours, ensuring all life limits are met and not exceeded
- b) Data utilized to support the establishment of the identified Life Limits
Flight logs are analyzed and tracked to verify the condition of the flight systems. Battery cycle counts and aircraft hours are tracked, and notifications are implemented to notify when maintenance or inspection is needed

Crewmember Certification Qualification and Training

Information detailing the Certification, Qualification, and training of all required crewmembers.

Reference: SkySkopes Petition – A.2.8 Training

Reference: SkySkopes Petition – A.5 Proposed Conditions and Limitations #4, #8

- a) Describe the minimum pilot certification required.
Reference: SkySkopes Petition - A.5 Proposed Conditions and Limitations #4, 8, 9, 10, 11

All operations will use a visual observer (VO). The UA must be operated within visual line of sight (VLOS) of the PIC and VO. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license. The VO and PIC must be able to communicate verbally at all times. The PIC must ensure that the VO can perform the duties required of the VO.

PIC certification: Under this exemption, a PIC must hold a current remote pilot certificate.

The PIC must also hold a current FAA airman medical certificate and a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government.

The PIC and VO will be trained and qualified in accordance with the operating documents.

b) Describe all operator specific qualification and training requirements.

No pilot shall operate the aircraft unless trained by another experienced pilot on the platform. All flight crew personnel are required to undergo our extensive screening and training program. Along with the company specific training, all crew members are to comply with industry specific training, this includes programs such as One Basin One Way, H2S Clear, and other programs.

c) Other required crew (VO, maintenance personnel) training

All operations use a visual observer (VO). The UA must be operated within visual line of sight (VLOS) of the PIC and VO. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license. The VO and PIC must be able to communicate verbally at all times. The PIC must ensure that the VO can perform the duties required of the VO. The payload operator will also complete the VO training requirements.

UA Pyrotechnic/Fireworks – Not Applicable

Information detailing the pyrotechnic/fireworks mentioned in your petition.

- a) Specific types, sizes, numbers, and HazMat categories.
- b) Describe the method by which these will be ignited and/or launched.

Operation Specifics

1. What is the location of the operation (provide a map printout or coordinates for the boundaries)?

SkySkopes expects to perform these operations at clients industrial sites across the U.S.

2. Approximately how many operations per day/year are expected to flown? Is each operation a round trip or a one-way flight per day?

SkySkopes expects to perform 10-20 operations per month. Each operation would be 1-2 flights at a site.

3. What are the operating hours in a typical day at the location?

Operations would be completed during daylight hours typically starting around 7am and finishing by 6pm.

4. What type(s) of aircraft will be used? What is the aircraft's maximum weight?

DJI T16 and T20 Agras UAS. The T16 aircraft is built to operate up to 93 lbs. maximum gross takeoff weight (MGTOG) and the T20 up to 105 lbs. MGTOG.

5. What altitudes will the aircraft be operating at for cruise and deliver?

The aircraft will not have cruise or delivery as part of the operation. It will take off below the asset, climb to altitude, position over the asset, maneuver during cleaning, and then descend for landing.

6. Are there any historic/tribal properties, neighborhoods, schools, parks, wildlife or protected natural areas below or adjacent to the area of operations?

The operations areas are expected to take place in mainly very rural locations at industrial sites. We do not expect operations near neighborhoods, schools, or parks. If there are historic/tribal properties or wildlife or protected natural areas nearby, SkySkopes will coordinated with our clients for site access and to meet any special requirements. SkySkopes has a full time employee who coordinates airspace and land access as well as compliance with any other requirements for operations.

7. Is there a possibility that the operations could cause significant public controversy in the area?

Because of the industrial location of the operations and the primary purpose to prevent accidental ignition, we expect there will be no or little public controversy for the operations. Additionally, crews are trained on de-escalation and reporting procedures if encountering a member of the public during an operation.

8. Is this a type of operation that would typically be conducted by a larger manned aircraft or ground vehicle?

These types of operations are currently conducted by an aerial lift, crane, or building scaffolding which require extensive coordination and downtime for clients.

9. Has any public outreach been accomplished already (describe)?

Public outreach has not been accomplished for these operations.